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ABSTRACT

A description is provided of the implementation and operation of a Regional Data Processing Center. The Center services the county government, the community college, and the school districts of Burlington County, New Jersey. Topics which are discussed include: 1) the planning study which indicated the feasibility of a regional center; 2) the organization and governance of the center; 3) the value and uses of a time-sharing computer in a regional center; and 4) the major applications which have been developed and are now operational. (Author)

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Use of a Time-Sharing Computer in a Regional Data Processing Center at Burlington County, New Jersey

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Abstract

This paper describes the implementation and operation of a Regional Data Processing Center which services the county government, community college and school districts of Burlington County, New Jersey.

Topics which are described include:

1) The planning study which indicated the feasibility of a regional center.

2) The organization and governance of the center.

3) The value and uses of a time-sharing computer in a regional center.

4) The major applications which have been developed and are now operational.

The regional center has a four year history of success and ambitious plans for the future. About eighteen months ago the center converted from batch equipment to a sophisticated time-sharing computer (DECsystem-10) and it now offers batch, on-line and time-sharing capabilities to its users.

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Burlington County is a rapidly growing suburban county located in the southern portion of New Jersey within the Philadelphia-New York corridor. For each of the last two decades the county has had a population growth of over 50%. Although now the growth rate is somewhat decreasing it is still expected that in the period 1970-80 the population will increase by over 25%. The current population of the county is approximately 330,000. In such a rapidly growing county, governmental and educational institutions have been hard pressed to keep pace with the needs of the population. One way in which these institutions have managed to continue to provide quality services, while still maintaining a reasonable tax rate, has been through the implementation of a Regional Data Processing Center which services the county government, community college and school districts of the county.

A Joint Feasibility Study

In examining the enrollment projections and computational needs of a county community college to be opened in the Fall of 1969, it became apparent to planners that the college alone could not initially afford to lease a computer with enough capacity to meet all of its future needs. It was also becoming obvious that many of the county agencies could benefit from computerization. Consequently, a study was authorized through the technical services division of a major consulting corporation to determine the feasibility of a joint county-college computer center. The hypothesis: a fast-growing suburban county such as Burlington would have developing needs

for data processing in the immediate future. As one of the major educational agencies in the county, the college could team up with the county government to develop a joint computer center that would be economically and operationally feasible for both organizations. The study was completed in 1968 and found that the factors affecting the relative desirability of a joint computer system versus separate systems for the county and the college were both economic and operational. The economic question in its simplest form asked whether the total cost of a joint system is less than the total cost of two separate systems. The operational question asked whether better service can be provided by a joint system than by two separate installations. These simple questions, however, had to be formulated in a more complex fashion in order to address realistic situations. They had to ask whether the added operational benefits would justify the extra cost of a larger system, or whether the cost savings of a joint system would justify the operational compromises that such a system must involve.

The technical feasibility of a joint county-college computer system was found to be not open to question. Much more complex and widely distributed systems had been and were being implemented at this time. The orientation of most third generation computer designs towards both business and scientific classes of processing, and more important, the orientation toward processing support of communications and remote terminals greatly simplified the technical problems.

The real question was whether a technically capable system was available within the limits of economic and operational feasibility.

The study found that a joint computer center offers economic advantages over separate systems. Not only would savings result from equipment and personnel factors but both agencies would benefit from the additional hardware and software capabilities that the larger system would have, particularly in the on-line systems area. The potential disadvantage was primarily the inconvenience imposed in sharing the system with another user and in potential loading and priority problems. The study noted that:

> It is the opinion of the study team that if both the county and the college operate in the on-line mode that a minimum, or no inconvenience, would be encountered by either user. This is a result of the fact that anyone using any of the remote terminals will be operating independently of any other users.

The following excerpt summarizies the consultants conclusions:

> It is the opinion of the study team that a combined joint computer center offers important economic and operational advantages to both the county and the college. It also offers the prospect of future service to other community agencies in the county which separate systems could not provide so well.

Organization and Governance

The study recommended that the computer center be located at the college and that it be established as an organizational entity within the college, with the Director reporting to the President. This would remove the computer center from the organizational structure of any using department, including the

county, and would provide accessibility of the computer to students and staff. Because of the suggested on-line approach, the county applications would be indifferent to the computer location. The authors of the study observed that the college is an agency of the county. As such, all matters of sufficient moment concerning the joint computer center are ultimately under the cognizance of the freeholders.

In actual practice, it has been found that the decision to place the computer center within the organizational structure of the college was a sound one. In many ways the head of the computer center actually reports to two bosses, the President of the College and the County Board of Freeholders. Although this dual reporting structure is not recommended by most management textbooks, we have found it to be much more desirable than other alternatives. In our opinion the most important factor is that the entire operation of the center must be the responsibility of a single administrator even though he may report to two agencies. This is much more preferable than having a staff for each agency attempting to use one central facility. There have been numerous examples of failure in organizations that have attempted this latter approach. Obviously the centralized approach is much more feasible when the center is equipped with a time-sharing computer which allows many users to be simultaneously using the system each oblivious to the fact of the many other jobs that are being run at the same time.

From Batch to Time-sharing

The joint center was established in the Fall of 1969 when

the community college also opened for its first year. The college enjoyed the unique experience of having a computer installed and operational before the registration of its first student. The initial computer hardware was a moderate-sized IBM System/360 which was configured to do only batch work. This system was seen only as an interim system since the eventual objective was to move toward a substantial on-line capability. Many of the basic information systems of the college and county were developed on this batch system. It served the using agencies for a period of about two and a half years. We then began an exhaustive evaluation study to determine the permanent computing system.

There were three major requirements of the new computer system in order to serve both college and county objectives:

1. The ability to develop and operate batch-type administrative systems with a particular emphasis on the ability to multi-program.
2. Quick and easy development of a number of on-line data collection and administrative systems, featuring terminals located at work sites capable of retrieving and updating data from centralized files.
3. A general time-sharing system for use by both students and professional staff.

After an extensive search a Digital Equipment Corporation DECsystem-10 was selected as the computer system best able to do the job. This system not only met the fiscal requirements imposed by a tight budget, but also offered one of the most time-proven, time-sharing software systems available from any

vendor in today's market. Other attractive features of the system were the fact that it will be very easy to expand since it can grow in a modular way and also its excellent COBOL software. This allowed a very easy conversion of the already existing batch work and allowed the development of the new systems in a language in which the current programming staff was conversant.

Burlington's DECsystem-10 is based around a CPU with a memory of 400K bytes of storage. In addition, there are over 100 million characters of disk storage, two magnetic tape drives and the usual card and printing capabilities. The system currently has 24 terminal ports with 8 more scheduled to be installed by the end of summer.

Computer Applications

In the relatively short time that the regional computer center has been in operation, a number of computer applications have been implemented to service the needs of the various agencies of the Burlington County government.

The time-sharing system is used extensively by the County Treasurer's office. One of the first major systems that was implemented was a comprehensive personnel and payroll system. Personnel records for the county's more than 1200 employees are maintained on the computer, including such data as date of employment, department, job classification, insurance data and various civil service required data items. This personnel file interfaces to the payroll system and various reports useful for personnel purposes are available upon demand. The payroll system provides the usual paycheck and explanatory stubs for

all employees and various reports that are used to keep track of net earnings of employees on a quarterly and yearly basis, quarterly tax reports, W2 forms for all employees, year-to-date social security reports, bond reports and other usual payroll outputs.

A recent system which has been developed and is now in a parallel run stage utilizes the on-line capabilities of the DECsystem-10 for the benefit of the County Treasurer's office. This is a complete budget and general ledger accounting system. This system maintains the entire county budget by department and object code on the computer system with instant access to this data allowed by terminals located in the Treasurer's office. The budget master file is updated daily via the on-line terminal with all of the usual encumbrance and budget transaction data. In addition, accounts payable checks and journals are produced on the terminals.

In the Probation Department extensive accounting and record keeping is done by the computer. This includes the daily payments journal, individual account historys, master file printouts, beneficiary lists, delinquency letters and other assorted reports for domestic relations and criminal fines. In addition, the system is now keeping track of much of the record keeping for the criminal probation function carried on by the department.

The County Board of Elections uses the computer to maintain over 130,000 registered voters. Using the computer-based files the Election Board has eliminated many man-months of

work which were previously devoted to printing voter lists using address-o-graph plates. The personnel thus freed can devote more productive time to administrative needs. Computer printed listings have provided the Board with working printouts which have reduced the time required to post party changes and produce Split Party Lists.

The Court Administrator's office uses the computer for the entire Jury Selection process. The computerized Jury Selection Management Information System has eliminated the repetitive manual jobs previously associated with jury selection. Such functions now produced solely by the computer are: questionnaire addressing, warning questionnaire addressing, jury summons, jury attendance address labels and petit sheets. In addition to the actual working reports the jury system provides the Court Administrator with management reports so that the jury selection process can be continually monitored and administrative decisions can be made on actual data. As an example, before the computer system was initiated a panel of jurors was comprised of 200 people. Using the Juror Utilization report the number of people now required per panel is 120. This saving when spread over a year means that 2000 fewer people will be required to serve jury duty with a resulting cost savings of approximately $10,000 for this one segement of the system alone.

The planning commission of the county has been using the computer quite extensively in the last few years. A complete data bank of all business and industry is contained on computer files and is accessible in a variety of ways. In addition,

analysis of the U.S. census tapes has been done by this department for population and growth studies.

For the County Welfare Department the computer provides a payroll system which is separate from the regular county system. In addition, we are now conducting a system study to explore the feasibility of computerizing all welfare case records and providing an on-line access capability for use by the employees of this department.

Currently wanted persons lists and jail lists are produced for the Burlington County Prosecutor's office. These computer maintained lists eliminate many man-weeks of repetitive and laborious work, thus freeing personnel for more productive and responsible duties. The Prosecutor Management Information System, which is in its initial stages of development, is designed to provide planning, control and research for a large number of criminal cases. The system will automatically produce subpoenas for witnesses and scheduling reports. Distinct patterns of committed crimes will be stored for convicted criminals (modus operandi) which will be used to provide suspects when patterned crimes are committed.

In addition to the above there is a generalized mailing list system which is used by a number of county departments for maintaining lists of names and addresses which can be retrieved by specified codes and printed on adhesive labels. All elections conducted in the county are tabulated and analyzed by the on-line computer system. An inventory periodicals system is also provided for the county library which indexes periodicals in a

variety of ways and also helps keep track of reorder and subscription information.

On the Burlington County College campus the DECsystem-10 is used in a variety of ways. In addition to providing both on-line and batch computer services to the students of the college the system is also used extensively in the admissions, registration, student scheduling, library and business areas.

Student registration was once a typically massive headache for all concerned. Now every Burlington student is scheduled and registered on on-line terminals and when he leaves the registration area he is in possession of a computer-printed schedule of classes. Before classes start the next day each instructor has an accurate printed copy of a roster of all students assigned to his classes.

In support of the instructional program an extensive Computer Managed Instruction (CMI) system has been developed and has proven quite successful. This system allows instructors to maintain a data bank of test questions on the computer which is accessible and updated through use of on-line terminals. Through this system computer generated tests can be easily obtained. A unique test center is equipped and staffed to administer these tests to the students on an individual walk-in basis rather than the usual class or group mode. When the student has finished taking his test he inputs the answer form through an on-line optical scanning device which sends the data to the time-sharing computer where the test is immediately scored and the results sent back through a CRT

terminal in the Test Center. This allows a student to view the results of his test immediately. In addition these test results are stored in an instructor's file which he may access at any time through on-line terminals and may analyze in a variety of ways.

In the college library an on-line circulation system helps keep track of the more than 30,000 books stored in the library as well as more than 10,000 non-book media. In the course of any given day the DECsystem-10 will check books in and out, locate books via the accession numbers, request lost book cards and file entry cards, list all of the books taken out by any particular student and tell the checkout clerk whenever any student with current overdue books attempts to take out new books. On a batch basis the data collected via the on-line system is used to generate overdue book notices and a number of analytical reports.

With the advent of the time-sharing computer it became possible for the computer center to also offer services to school districts which are located within the county. The DECsystem is helping to provide better instruction while significantly lowering the administrative costs of running the schools. By placing terminals in the school districts and connecting them by telephone lines to the college's computer center, many students are now using terminals in their math and science courses.

The computer center also helps school districts in maintaining student records, scheduling, grading and attendance

accounting. Over 9 schools districts are now using the center and it is expected that there will be even more use of this service in the near future.

In summary, the county government, college and the school districts of Burlington County now seem to be reaping huge benefits from the implementation of a Regional Data Processing Center with every indication that the benefits will continue for years to come. As the county population continues to grow it is expected that the computer will keep pace, growing side by side with Burlington County institutions.